

**GLOSSARY OF TERMS
FOR
CHEMICAL AGENTS
AND
CHEMICAL DEFENSE EQUIPMENT**

DECEMBER 1994

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**Center for Health Promotion and Preventive Medicine (PROV)
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BACKGROUND

In this era of the sophisticated and complex, integrated battlefield, the threat of enemy forces using chemical agents has become a very real issue. The contingencies necessary to protect U.S. and allied forces have never been more important than they are today, especially in the area of design and fielding of chemical defense equipment. Not only is it imperative to define the magnitude and extent of toxicological implications resulting from the use of chemical warfare agents, it is absolutely critical that masks and field uniforms be produced to reflect state-of-the-art technology in their protective capabilities.

There are several ongoing initiatives directed at evaluating the health hazards, integrating human systems, and executing test plans on potential materials and prototype pieces of equipment. Such efforts include Program Manager Soldier, Manpower and Personal Integration, and the Health Hazard Assessment Program, to name a few.

INTRODUCTION

One other part of solving these very real and important problems is communicating the issues in an accurate and consistent manner. U.S. Army Center for Health Promotion and Preventive Medicine (Provisional) has developed this Glossary to serve as a tool in standardizing terminology and providing insight into the technical subtleties associated with any discussion of chemical agents and chemical defense equipment. Hopefully, the definitions and explanations provided herein will be part of the solution to problems on the integrated battlefield as we move into the Twenty-First Century.

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SECTION I

Acronyms and Chemical Abbreviations

Acronyms and Chemical Abbreviations

AAE	Army Acquisition Executive
ABC	Atomic, Biological and Chemical
ACAA	Automatic Chemical Agent Alarm
ACAT	Acquisition Category
ACGIH	American Conference of Governmental Industrial Hygienists
ADAP	Army Designated Acquisition Program
ADI	Acceptable Daily Intake
AEL	Adverse Effect Level; Airborne Exposure Limits
AIC	Acceptable Intake for Chronic Exposure
AIS	Acceptable Intake for Subchronic Exposure; Automated Information System
AMC	Army Materiel Command
AP	Acquisition Plan
APB	Acquisition Program Baseline
ARL-HRED	Army Research Laboratory--Human Research and Engineering Directorate
AS	Acquisition Strategy
ASARC	Army Systems Acquisition Review Council
BOIP	Basis of Issue Plan
BTA	Best Technical Approach
BZ	Breathing Zone
c	Ceiling Limit
C	Concentration
CAIG	Cost Analysis Improvement Group
CAIRA	Chemical Accident of Incident Response and Assistance
CAM	Chemical Agent Monitor
CAS	Chemical Abstracts Service
CEGL	Continuous Exposure Guidance Level
CERCLA	Comprehensive Environmental Response, Compensation, and Liability
CFR	Code of Federal Regulations
ChE	Cholinesterase
ChE ₅₀	50 percent cholinesterase
COMDEV	Combat Developer
CSEPP	Chemical Stockpile Emergency Preparedness Program
DAB	Defense Acquisition Board
DAES	Defense Acquisition Executive Summary

DAP	Designated Acquisition Program
DCSPLANS	Deputy Chief of Staff for Plan, Force Integration, and Analysis
DHHS	Department of Health and Human Services
DSARC	Defense Systems Acquisition Review Council
DT	Developmental Testing
DT&E	Developmental Test and Evaluation
EEGL	Emergency Exposure Guidance Level
FAT	First Article Test
FEMA	Federal Emergency Management Agency
FOT&E	Follow-On Operational Test and Evaluation
FP	Functional Proponent
FUE	First Unit Equipped
FYDP	Future Years Defense Plan
gm/L	Grams per liter
H	Mustard
HD	Distilled Mustard
HEPA	High-Efficiency Particulate Air
HFE	Human Factors Engineering
Hg	Mercury
HHAR	Health Hazard Assessment Report
HHDR	Health Hazard Domain Report
HSI	Human Systems Integration
HSIP	Human Systems Integration Plan
IARC	International Agency on Research for Cancer
IDLH	Immediately Dangerous to Life or Health
IH	Inhalation
ILSMT	Integrated Logistics Support Management Team
IMA	Information Mission Area; Independent Medical Assessor
IPM-TLVs	Inhalable Particulate Mass-Threshold Limit Values
IPR	In-Process Review
JTA	Joint Table of Allowances
kg	Kilogram
LCSMM	Life-Cycle System Management Model
LDS	Lightweight Decontamination System
LEL	Lowest-Effect Level

LOAEL	Lowest-Observed Adverse Effect Level
LRRDAP	Long-Range Research, Development and Acquisition Plan
m	Meter
MAA	Mission Area Analysis (currently obsolete term)
MAAG	Mission Area Analysis Group
MADP	Materiel Acquisition Decision Process; Mission Area Development Plan (currently obsolete term)
MAIS	Major Automated Information Systems
MAISRC	Major Automated Information Systems Review Council
MANPRINT	Manpower and Personnel Integration
MATDEV	Materiel Developer
mg	Milligram, 1×10^{-3} gram
mg/kg	Milligram/Kilogram
mg/m ³	Milligrams per cubic meter
mg min/m ³	Milligram-minutes per cubic meter
MIL-STD	Military Standard
MJWG	MANPRINT Joint Working Group
mm	Millimeter
MMMP	Manufacturer's MANPRINT Management Plan
MNS	Mission Need Statement
MOPP	Mission-Oriented Protection Posture
MOS	Military Occupational Specialty
MV	Minute Volume
NBC	Nuclear, Biological, and Chemical
NCP	National Contingency Plan
NDI	Nondevelopmental Item
NET	New Equipment Training
NIOSH	National Institute for Occupational Safety and Health
NOAEL	No-Observed Adverse Effect Level
NOEL	No-Observed Effects Level
OC	Ocular
ODCSPER	Office of the Deputy Chief of Staff for Personnel
OJT	On-the-job Training
ORD	Operational Requirements Document
OSD	Office of the Secretary of Defense
OSHA	Occupational Safety and Health Administration

OT	Operational Testing
OT&E	Operational Test and Evaluation
P2	Pollution Prevention
P ³ I	Preplanned Product Improvements
PC	Percutaneous
PEL	Permissible Exposure Limit
PERSCOM	Personnel Command
PHA	Preliminary Hazard Analysis
PHL	Preliminary Hazards List
PIP	Product Improvement Program/Proposal
PM	Program Manager
PO&ILCCE	Program Office and Independent Life-Cycle Cost Estimate
POM	Program Objective Memorandum
PPBES	Planning, Programming, Budgeting, and Execution System
PPE	Personal Protective Equipment
ppm	Parts per million
PRIMIR	Product Improvement Information Reports
PSS-TLVs	Particle Size-Selective-Threshold Limit Values
RAC	Risk Assessment Code
RAM	Reliability, Availability, and Maintainability
R&D	Research and Development
RDA	Research, Development, and Acquisition
RDT&E	Research, Development, Test and Evaluation
RfC	Reference Concentration
RfD	Reference Dose
RfD _{dt}	Developmental Reference Dose
RfD _s	Subchronic Reference Dose
RPM-TLVs	Respirable Particulate Mass-Threshold Limit Values
RSCAAL	Remote Sensing Chemical Agent Alarm
SAR	Safety Assessment Report
SDC	Sample Data Collection
SEB	Staphylococcus Enterotoxin Type B
SFO	Senior FEMA Official
SMMP	System MANPRINT Management Plan
SPEGL	Short-Term Public Emergency Guidance Level
SRFC	Service Response Force Commander
SSDR	Soldier Survivability Domain Report; System Safety Domain Report

SSE	Source Selection Evaluation; System Safety Engineering
SSG	Special Study Group
STAR	System Threat Assessment Report
STB	Super Tropical Bleach
STEL	Short-Term Exposure Limit
STF	Special Task Force
TAD	Target Audience Description
TC	Type Classification
TD	Toxic Dose
TDA	Table of Distribution and Allowances
TDP	Technical Data Package
T&E	Test and Evaluation
TEMP	Test and Evaluation Master Plan
TIWG	Test and Integration Working Group
TLV	Threshold Limit Value
TLV-C	Threshold Limit Value-Ceiling
TLV-STEL	Threshold Limit Value-Short-Term Exposure Limit
TLV-TWA	Threshold Limit Value-Time-Weighted Average
TMDE	Test Measurement and Diagnostic Equipment
TOA	Trade-Off Analysis
TOD	Trade-Off Determination
TO&E	Table of Organization and Equipment
TPM-TLVs	Thoracic Particulate Mass-Threshold Limit Values
TRADOC	Training and Doctrine Command
TT	Technical Testing
TWA	Time-Weighted Average
UF	Uncertainty Factor
μg	Microgram, 1×10^{-6} grams or 1×10^{-3} mg
μm	Micrometer(s)
USANCA	U.S. Army Nuclear and Chemical Agency
USEPA	U.S. Environmental Protection Agency

SECTION II

Chemical Agents and Chemical Defense Equipment Terms

Chemical Agents and Chemical Defense Equipment Terms

ABC-M8 VGH Chemical Agent Detector Paper

M8 detector paper comes in booklets of 25 sheets. The paper detects and identifies liquid V- or G-type nerve agents or H-type blister agents.

ABC-M11 Portable Decontaminating Apparatus

A device containing DS-2 used to decontaminate small areas, such as the steering wheel or other equipment that soldiers must touch. It is filled with 1½ quarts of DS-2.

Absorption

The penetration of a substance into or through another substance or medium. The uptake and entry of a substance through intact skin, eyes, or linings of the body (i.e., ingestion or once the substance has entered the lungs).

Acceptable Daily Intake (ADI)

An estimate of the dose resulting from exposure to a toxicant that is likely to be without harmful effect even if continued exposure occurs over a lifetime.

Acceptable Intake for Chronic Exposure (AIC)

An estimate similar in concept to the reference dose (RfD) but derived using a less strictly defined methodology. Chronic RfDs have replaced AICs as the Center's preferred values for use in evaluating potential noncarcinogenic health effects resulting from chronic exposure to a chemical.

Acceptable Intake for Subchronic Exposure (AIS)

An estimate similar in concept to the subchronic RfD but derived using a less strictly defined methodology. Subchronic RfDs have replaced AISs as the Center's preferred values for use in evaluating potential noncarcinogenic health effects resulting from subchronic exposure to a chemical.

Access Control

The prevention of unauthorized entry into a specific area by using road barriers and traffic control. The access-controlled area may be established to control and monitor a restricted area that may have undergone agent contamination.

Accuracy

The discrepancy between the true value and the result obtained by measurement.

Acquisition Plan (AP)

A plan derived from the Acquisition Strategy (AS) summarizing acquisition background and need, objectives, conditions, strategy, and related functional planning (with emphasis on contractual aspects). It provides detailed planning for contracts and milestone charting.

Acquisition Strategy (AS)

The conceptual framework for conducting materiel acquisition, encompassing the broad concepts and objectives that direct and control the overall development, production, and deployment of a materiel system. It evolves in parallel with the system's maturation and must be stable enough to provide continuity but dynamic enough to accommodate change.

Action Level

A concentration designated in Title 29, Code of Federal Regulations, Part 1910 (29 CFR 1910) for a specific substance, calculated as an 8-hour time-weighted average, which initiates certain required activities such as exposure monitoring and medical surveillance. [Note: For many substances the action level is one-half the permissible exposure limit (PEL.)]

Acute Effects

Effects that arise quickly and have a relatively short severe course.

Acute Exposure

Single or multiple exposure(s) to a substance for less than 24 hours.

Acute Toxicity

A term used to describe immediate toxicity. Its use is associated with toxic effects that are severe (e.g., mortality) in contrast to the term "subchronic toxicity," which is associated with toxic effects that are less severe. The term "acute toxicity" is often confused with that of acute exposure.

Adsorption

The adhesion of a substance to the surface of another solid or liquid (not to be confused with absorption).

Adverse Effect

A biochemical change, functional impairment, or pathological lesion that impairs performance and reduces the ability of the organism to respond to additional challenges.

Adverse Effect Level (AEL)

An exposure level at which there are statistically or biologically significant increases in frequency or severity of deleterious effects between the exposed population and its appropriate control group.

Aerosol

Airborne solid or liquid substances classified as dusts, fumes, smokes, mists, and fogs according to their physical nature, particle size, and method of generation. Particle size may vary from 100 micrometers (μm) to 0.01 μm in diameter.

Agent Area

A physical location where entry and exit are restricted and controlled; where agents are manufactured, processed, packaged, repackaged, demilitarized, released, handled, stored, used, or disposed of.

Agent GA

The chemical Ethyl N,N-dimethylphosphoramidocyanidate, Chemical Abstracts Service (CAS) registry number 77-81-6, in pure form and in the various impure forms found in storage as well as in industrial, depot, or laboratory operations (synonym = Tabun). Agent GA is a nerve agent.

Agent GB

The chemical Isopropyl methylphosphonofluoridate, CAS registry number 107-44-8, in pure form and in the various impure forms found in storage as well as in industrial, depot, or laboratory operations (synonym = Sarin). Agent GB is a nerve agent.

Agent GD

The chemical Pinacolyl methyl phosphonofluoridate, methyl-1, 2, 2-trimethylpropyl ester, CAS registry number 96-64-0, in pure form and in the various impure forms found in storage as well as in industrial, depot, or laboratory operations (synonym = Soman). Agent GD is a nerve agent.

Agent H

Levinstein mustard, CAS registry number 471-03-4. A mixture of 70 percent bis(2-chloroethyl) sulfide and 30 percent sulfur impurities produced by the Levinstein process. Agent H is a blister agent.

Agent HD

Distilled mustard or bis(2-chloroethyl) sulfide, CAS registry number 505-60-2. Distilled mustard (HD) is mustard (H) that has been purified by washing and vacuum distillation to reduce sulfur impurities. Agent HD is a blister agent.

Agent HT

A plant-run mixture of 60 percent HD and 40 percent T plus a variety of sulfur contaminants and impurities. T is bis[2-(2-chloroethylthio)ethyl]ether, CAS registry number 63918-89-8. T is a sulfur, oxygen and chlorine compound similar in structure to HD. Agent HT is a blister agent.

Agent L, or Lewisite

Dichloro 2-chlorovinyl dichloroarsine, CAS registry number 541-25-3; its chemical formula is $C_2H_2AsCl_3$. Agent L is a blister agent.

Agent Operating Area

That portion of an agent area where workers are actively conducting agent operations.

Agent VX

The chemical Phosphonothioic acid, methyl-S-[2-(bis(1-methylethyl)amino)ethyl] 0-ethyl ester, CAS registry number 50782-69-9, in pure form and in the various impure forms that may be found in storage as well as in industrial, depot, or laboratory operations. Agent VX is a nerve agent.

Agent Worker

An individual assigned to exposure category A, B, or C.

Airborne Exposure Limits (AEL)

Allowable concentrations in the air for occupational and general population exposures.

Anecdotal Data

Data based on descriptions of individual cases rather than on controlled studies.

Anthropometric

Of or relating to the study of human body measurements, especially on a comparative basis.

Antidote

Any substance or other agent that inhibits or counteracts the effects of a poison.

Aqueous Media

Environmental media that contain a large proportion of water, such as storm water runoff from agricultural fields, animal and plant fluids, etc.

Availability (Operational)

A measure of the degree to which a system is either operating or is capable of operating at any time when used in its typical operational and support environment.

Bacterium

Any of numerous unicellular microorganisms of the class Schizomycetes, occurring in a wide variety of forms, existing

either as free-living organisms or as parasites, and having a wide range of biochemical, often pathogenic, properties.

Basis Of Issue Plan (BOIP)

A planning document that lists specific levels at which a new item of materiel may be placed in a unit/organization, the quantity of the item proposed for each organization element, and other equipment and personnel changes required as a result of the introduction of the new item. It is not an authorization document.

Best Technical Approach (BTA)

A document prepared by a special task force (STF), special study group (SSG), or jointly by the combat developer (COMDEV) and materiel developer (MATDEV) during concept exploration. It identifies the best, general technical approach based on the results of the trade-off determination (TOD) and an analysis of trade-offs among support and technical concepts, life-cycle costs, and schedules.

Bias

Refers to a more or less persistent tendency for measurements, as a group, to be too large or too small.

Binary Chemical Munitions

Munitions designed to use two less toxic precursors that react during firing of the weapon system to produce a chemical agent for release on a target.

Bliss Slope

The slope of the dose-response curve when the x-axis is expressed as the log of the administered dose and the y-axis is expressed as probits (probability units) of response. It is named for Bliss, who developed the technique. It is also called a probit slope.

Blister Agent

A chemical (such as sulfur mustard) that produces local irritation and damage to the skin and mucous membranes that progresses in severity to fluid-filled blisters on skin. This chemical can cause damage by exposure to liquid or vapor inhalation (IH). It can also produce damage to the respiratory tract.

Blood Agent

A chemical agent (e.g., hydrogen cyanide, allyl chloride) that is absorbed into the general circulation system and carried to all body tissues. These agents deprive tissue cells of oxygen, even though the blood is capable of carrying oxygen. The brain, being highly dependent upon a continual source of oxygenation, is especially susceptible. Clinical signs include hyperventilation, which further enhances the dose received, resulting in abrupt cardiovascular collapse.

Breathing Zone (BZ)

That zone of the surrounding environment in which a person performs the normal respiratory function.

Breathing Zone Sample

An air sample collected in the breathing area (around the nose) of an individual to assess his/her exposure to airborne contaminants.

Buffer Zone

As used by the Federal Emergency Management Agency (FEMA) and the U.S. Environmental Protection Agency (USEPA), an area adjacent to a restricted zone which residents may return to, but where protective measures are recommended to reduce dose or exposure.

Carcinogen

A chemical substance known to induce neoplastic change (malignancies) in experimental animals and/or man. Four types of response are generally accepted as evidence of induction of neoplasms:

- a. An increase in incidence of the tumor types that occur in controls.
- b. The development of tumors earlier than controls.
- c. The occurrence of tumor types not observed in controls.
- d. An increased multiplicity of tumors.

Carcinogen Classification Schemes

a. American Conference of Governmental Industrial Hygienists (ACGIH).

(1) **A1--Confirmed Human Carcinogen:** The agent is carcinogenic to humans based on the weight of evidence from epidemiologic studies of, or convincing clinical evidence in, exposed humans.

(2) **A2--Suspected Human Carcinogen:** The agent is carcinogenic in experimental animals at dose levels, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that are not considered relevant to worker exposure. Available epidemiologic studies are conflicting or insufficient to confirm an increased risk of cancer in exposed humans.

(3) **A3--Animal Carcinogen:** The agent is carcinogenic in experimental animals at a relatively high dose, by route(s) of administration, at site(s), of histologic type(s), or by mechanism(s) that are not considered relevant to worker exposure. Available epidemiologic studies do not confirm an increased risk of cancer in exposed humans. Available evidence suggests that the agent is not likely to cause cancer in humans except under uncommon or unlikely routes or levels of exposure.

(4) **A4--Not Classifiable as a Human Carcinogen:** There are inadequate data on which to classify the agent in terms of its carcinogenicity in humans and/or animals.

(5) **A5--Not Suspected as a Human Carcinogen:** The agent is not suspected to be a human carcinogen on the basis of properly conducted epidemiologic studies in humans. These studies have sufficiently long follow-up, reliable exposure histories, sufficiently high dosage, and adequate statistical power to conclude that exposure to the agent does not convey a significant risk of cancer to humans. Evidence suggesting a lack of carcinogenicity in experimental animals will be considered if supported by other relevant data.

Substances for which no human or experimental animal carcinogenic data have been reported are assigned no carcinogen designation.

b. U.S. Environmental Protection Agency (USEPA).

(1) **Group A--Human Carcinogen:** Sufficient evidence in epidemiologic studies to support casual association between exposure and cancer.

(2) **Group B--Probable Human Carcinogen:** Limited evidence in epidemiologic studies (Group B1) and/or sufficient evidence from animal studies (Group B2).

(3) **Group C--Possible Human Carcinogen:** Limited to equivocal evidence from animal studies and inadequate or no data in humans.

(4) **Group D--Not Classified:** Inadequate or no human and animal evidence of carcinogenicity.

(5) **Group E--No Evidence of Carcinogenicity for Humans:** No evidence of carcinogenicity in at least two adequate animal tests in different species or in adequate epidemiologic and animal studies.

c. **International Agency on Research for Cancer (IARC).**

(1) **Group 1--The agent (mixture) is carcinogenic to humans.** *The exposure circumstance entails exposures that are carcinogenic to humans.* This category is used when there is sufficient evidence of carcinogenicity in humans. Exceptionally, an agent (mixture) may be placed in this category when evidence in humans is less than sufficient; however, there may be sufficient evidence of carcinogenicity in experimental animals and strong evidence in exposed humans that the agent (mixture) acts through a relevant mechanism of carcinogenicity.

(2) **Group 2.** This category includes agents, mixtures, and exposure circumstances for which, at one extreme, the degree of evidence of carcinogenicity in humans is almost sufficient, as well as those for which, at the other extreme, there are no human data but for which there is evidence of carcinogenicity in experimental animals. Agents, mixtures, and exposure circumstances are assigned to either Group 2A (probably carcinogenic to humans) or Group 2B (possibly carcinogenic to humans) on the basis of epidemiological and experimental evidence of carcinogenicity and other relevant data.

(3) **Group 2A--The agent (mixture) is probably carcinogenic to humans.** *The exposure circumstance entails exposures that are probably carcinogenic to humans.* This category is used when there is limited evidence of carcinogenicity in humans and sufficient evidence of carcinogenicity in experimental animals. In some cases, an agent (mixture) may be classified in this category when there is inadequate evidence of carcinogenicity in humans but sufficient evidence of carcinogenicity in experimental animals and strong

evidence that the carcinogenesis is mediated by a mechanism that also operates in humans. Exceptionally, an agent, mixture, or exposure circumstance may be classified in this category solely on the basis of limited evidence of carcinogenicity in humans.

(4) Group 2B--The agent (mixture) is possibly carcinogenic to humans. The exposure circumstance entails exposures that are possibly carcinogenic to humans. This category is used for agents, mixtures, and exposure circumstances for which there is limited evidence of carcinogenicity in humans and less than sufficient evidence of carcinogenicity in experimental animals. It may also be used when there is inadequate evidence of carcinogenicity in humans but sufficient evidence of carcinogenicity in experimental animals. In some instances, an agent, mixture, or exposure circumstance for which there is inadequate evidence of carcinogenicity in humans but limited evidence of carcinogenicity in experimental animals, together with supporting evidence from other relevant data, may be placed in this group.

(5) Group 3--The agent (mixture of exposure circumstance) is not classifiable as to its carcinogenicity to humans. This category is used most commonly for agents, mixtures, and exposure circumstances for which the evidence of carcinogenicity is inadequate in humans and inadequate or limited in experimental animals. Exceptionally, agents (mixtures) for which the evidence of carcinogenicity is inadequate in humans but sufficient in experimental animals, may be placed in this category when there is strong evidence that the mechanism of carcinogenicity in experimental animals does not operate in humans. Agents, mixtures, and exposure circumstances that do not fall into any other group are also placed in this category.

(6) Group 4--The agent (mixture) is probably not carcinogenic to humans. This category is used for agents or mixtures for which there is evidence suggesting lack of carcinogenicity in humans and in experimental animals. In some instances, agents or mixtures for which there is inadequate evidence of carcinogenicity in humans but evidence suggesting lack of carcinogenicity in experimental animals, consistently and strongly supported by a broad range of other relevant data, may be classified in this group.

Carcinogenicity

Refers to the potential for development of cancer in a living individual. A cancer is a malignant tumor resulting from a change in the normal growth and development of cells. (Cancerous

tumors have the tendency to invade surrounding tissue and spread to other sites in the body.)

Casualty

Any person who is lost to the organization by reason of having been declared dead, wounded, injured, diseased, interned, captured, retained, missing, missing in action, beleaguered, besieged, or detained.

Ceiling Limit (c)

An airborne concentration of a substance that should not be exceeded.

Ceiling Value

Normally refers to the maximum exposure concentration at any time, for any duration. Practically, it may be an average value over the minimum time required to detect the specified concentration.

Certifying Official

For military and Department of the Army (DA) civilian personnel, the immediate commander (or, if civil service, the director) who is responsible for the operation or security, or both, of chemical weapons or materiel. If the commander or director is a colonel or a GM/GS-15, or above, he or she may delegate subordinates to act as organization-certifying officials. Such designees should be supervisors who can feasibly maintain sufficient contact to continually evaluate personnel. For Army contractor personnel, the Army official so designated in the contract is the certifying official. The certifying official validates that personnel considered for assignment to chemical surety duties meet the qualification requirements of the Chemical Personnel Reliability Program.

ChE₅₀

The dosage producing 50 percent cholinesterase (ChE) inhibition in the given population. (Note that the ChE₅₀ is not a dosage that produces this effect in 50 percent of the given population.)

Chemical Agent

A chemical substance intended for use in military operations to kill, seriously injure, or incapacitate people through its physiological effects. Included are blood, nerve, choking, blister, and incapacitating agents. Excluded are riot control agents, chemical herbicides, and smoke and flame materials.

Chemical Agent Casualty

An individual who has been affected sufficiently by a chemical agent to prevent or seriously degrade his or her ability to carry out the mission.

Chemical Agent Monitor (CAM)

This item is used to detect chemical agent vapors and provide a readout of the relative concentration of the vapor present.

Chemical Cartridge

A type of absorption unit used with a respirator for removal of solvent vapors and certain gases.

Chemical Substance

A substance usually associated with some description of its toxicity or exposure hazard, including solids, liquids, mists, vapors, fumes, gases, and particulate aerosols. Exposure, via inhalation, ingestion, or contact with skin or eyes, may cause toxic effects, usually in a dose-dependent manner.

Chemical Surety Material

All lethal and incapacitating chemical agents and their related weapon systems, including binary munitions and their critical components, that are either adopted or considered for military use. Excluded are riot control agents, defoliants, incendiaries, smoke, and flame.

Cholinesterase (ChE)

An enzyme that catalyzes the hydrolysis of acetylcholine to choline (a vitamin) and acetic acid.

Chronic Effects

Effects that persist over a long period of time. These effects may arise after months or years, may have a long course ranging from relatively mild to severe, or may arise immediately after exposure.

Chronic Exposure

Multiple or continuous exposures occurring over an extended period of time or a significant fraction of an individual's lifetime.

Chronic Reference Dose (RfD)

An estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of deleterious effects during a lifetime. Chronic RfDs are specifically developed to be protective for long-term exposure to a compound (as a Superfund program guideline, seven years to lifetime).

Chronic Study

A toxicity study designed to measure the effects (toxic) of chronic exposure to a chemical.

Chronic Toxicity

Effects that persist over a long period of time whether or not they occur immediately or are delayed. The term "chronic toxicity" is often confused with that of chronic exposure and is often used to describe delayed toxicity.

Combat Developer (COMDEV)

The command or organization responsible for formulating concepts doctrine, organization, materiel objectives, requirements, and user tests and evaluations.

Concentration (C)

The total quantity of substance present in a given unit volume (of gas or liquid). It may be expressed in any unit or mass per

unit of volume such as milligrams per cubic meter (mg/m^3), grams per liter (gm/L), or as volume per volume such as parts per million (ppm).

Confounder

A condition or variable that may be a factor in producing the same response as the substance under study. The effects of such factors may be discerned through careful design and analysis.

Consensus Standards

The standards prepared and written by industry, regulatory, and general interest groups based on known, available data. This information references the construction, usability, and safety of a product.

Contaminant

An impurity in water, soil, materials, etc.

Contaminate

To introduce an impurity into water, soil, materials, etc.

Contamination

Any deposit, adsorption, or absorption of radioactive, biological, or chemical substances on and by structures, areas, personnel, objects, soil, and water. Food and/or water made unfit for human or animal consumption by the presence of radioactive, biological, or chemical substances.

Continuous Exposure Guidance Level (CEGL)

The ceiling concentrations designed to avoid adverse health effects, either immediate or delayed, of more prolonged exposures and to avoid degradation in growth performance that might endanger the objectives of a particular mission as a consequence of continuous exposure for up to 90 days.

Convection

The transfer of heat through a liquid or gas by the actual movement of the molecules.

Convulsion

An abnormal violent and involuntary contraction or series of contractions of the voluntary muscles.

Criterion

A standard that represents the best scientific estimate of an environmental concentration of a contaminant corresponding to a given level of hazard, which in the case of noncancer toxicity, represents a level that is not expected to cause additional health risk.

Critical Issue

Those issues associated with the development of an item or system that are of primary importance to the decision authority in deciding whether to allow the item or system to continue into the next phase of development.

Critical System Criteria

Those design features that determine how well the proposed concept or system will function in its intended environment.

Critical System Functions

Those functions that the system must perform in order to carry out its intended mission.

Ct

This means **concentration times time**. Note that $Ct \neq k$, a 2-minute exposure to a concentration of 100 mg/m^3 [$Ct = 200 \text{ mg min/m}^3$ (milligram-minutes per cubic meter)], does NOT necessarily produce the same toxicological effects as a 50-minute exposure to a concentration of 4 mg/m^3 ($Ct = 200 \text{ mg min/m}^3$).

Ct Value

A measure of vapor or gas exposure by inhalation. It is a product of the concentration usually expressed in mg/m^3 and duration of exposure (t) in minutes. The resulting (and somewhat confusing units) are mg min/m^3 . It is important to recognize that this is not simple algebra; predictions of toxic effects should never be extrapolated more than twice, or less than half, known toxic exposure data. (Exposure to 1 mg/m^3 for 20 minutes;

2 mg/m³ for 10 minutes; or 4 mg/m³ for 5 minutes are all valid extrapolations of 2-minute exposure data. All three equate to a Ct of 20 mg min/m³.)

Decontaminate

To breakdown, neutralize, or remove a radioactive, chemical, or biological substance that poses a hazard to personnel or equipment.

Decontamination

Decreasing the amount of chemical agent on any person, object or area by absorbing, neutralizing, destroying, ventilating or moving chemical agents. Decontamination procedures are critical during:

- a. Response phase, to eliminate direct and immediate threats to human life.
- b. Recovery phase, to eliminate indirect and less immediate threats to human life (such as cross-contamination).

Defense Acquisition Executive Summary (DAES)

A summary designed to provide, on a regular and systematic basis, advance indications of both potential and actual program problems before they become significant. The report reflects the most current status of the program with comment on actual or projected changes in the appropriate sections.

Dermal Exposure

Exposure to or by absorption through the skin.

Dermatitis

The inflammation of the skin from any cause.

Designated Acquisition Program (DAP)

A program designated by the Army Acquisition Executive (AAE) for Army Systems Acquisition Review Council (ASARC) milestone review. The selection is based on resource requirements, complexity, and Congressional interest.

Designated Contract Physician

U.S. civilian physician under contract to provide occupational health services to employees at U.S. Government-owned facilities.

Detection Limit

Analytical capability based on the amount of the sample and the sensitivity of the analytical method.

Developmental Reference Dose (RfD_{dt})

An estimate (with uncertainty spanning perhaps an order of magnitude or greater) of an exposure level for the human population, including sensitive subpopulations, that is likely to be without an appreciable risk of developmental effects. Developmental RfDs are used to evaluate the effects of a single exposure event.

Development Testing (DT)

The testing of materiel systems conducted by the MATDEV using the principle of a single, integrated development test cycle to demonstrate that the design risks are minimized, the engineering development process is complete, and the system meets specifications. It is also used to estimate the system's military utility when it is introduced. This testing is conducted in factory, laboratory, and proving ground environments.

Diffusion

The process of spontaneous intermixing of different substances due to molecular motion which tends to produce uniformity of concentration.

Dosage

The amount of substance administered (or received) per body weight.

Dose

The amount of agent or energy that is taken into or absorbed by the body; the amount of substance, radiation, or energy absorbed in a unit volume, an organ, or an individual.

Dose Response

The characteristics of exposure to a substance and the spectrum of effects.

Dose-Response Evaluation

The process of quantitatively evaluating toxicity information and characterizing the relationship between the dose of a contaminant administered or received and the incidence of adverse health effects in the exposed population. From the quantitative dose-response relationship, toxicity values are derived that are used in the risk characterization step to estimate the likelihood of adverse effects occurring in humans at different exposure levels.

Dose-Response Relationship

A relationship between (1) the dose, often based on an "administered dose" (i.e., exposure) rather than absorbed dose, and (2) the extent of toxic injury produced by that chemical. The response can increase with greater doses and can be expressed either as the severity of injury or proportion of exposed subjects affected.

Dry Deposition

Deposition onto surfaces by settling out of particles, as opposed to droplets (liquid); also by absorption from the vapor phase.

DS-2

A decontaminating agent against biological and chemical contamination, an ageotropic mixture combining diethylenetriamine (70 percent), ethylene glycol monomethyl ether (28 percent), and sodium hydroxide (2 percent).

Dust

Any solid particulate matter from 1 to 150 microns in diameter.

ECT₅₀

The dosage causing a specifically defined effect in 50 percent of the given population. The route of exposure can be either inhalation or percutaneous (PC). Similarly, the ECT₀₅, ECT₁₆, ECT₈₄, and ECT₉₅ are the dosages causing that defined effect in

5 percent, 16 percent, 84 percent, and 95 percent of the given population, respectively.

ED₅₀

The dosage of liquid agent causing a specifically defined effect in 50 percent of the given population. Within this context, ED₅₀ refers to a percutaneous liquid exposure. Unless otherwise specified, all ED₅₀s are for percutaneous liquid contamination of bare skin. Similarly, the ED₀₅, ED₁₆, ED₈₄, and ED₉₅ are the dosages causing that defined effect in 5 percent, 16 percent, 84 percent, and 95 percent of the given population, respectively.

ED₅₀ (Median Effective Dose)

The dose of a substance that produces a given, defined therapeutic or toxic effect in 50 percent of the exposed population. NOT A 50 PERCENT EFFECT! This is a quantal (yes/no) determination, but it can be applied to graded effects if they are defined in a quantal manner (e.g., the dose of drug necessary to decrease diastolic blood pressure by 10 millimeters (mm) mercury (Hg) in 50 percent of the subjects). Under these circumstances, it is imperative that the assumptions and definition of "effect" be stated with the dose.

Emergency

A rare and unexpected situation with potential for significant loss of life, property, or mission accomplishment.

Emergency Exposure Guidance Level (EEGL)

A concentration of a substance in air (as a gas, vapor, or aerosol) that will permit continued performance of specific tasks during rare emergency conditions, lasting for periods of 1 to 24 hours. This should not be used for planned exposures because EEGLs are neither safe nor hygienic.

Emergency Phase

As used by the FEMA and the USEPA, the initial phase of response actions, during which actions are taken in response to a threat of release or a release in progress. Short-term protective actions, such as sheltering and evacuation, may be taken during this phase to mitigate the hazard from immediate exposure to the passing plume.

Endpoint

A response measure in a toxicity study.

Environment

The external surroundings and influences.

Error

In study of measurements, "error" does not mean "mistake," but it is a technical term denoting deviations from the average or some other computed quantity. Such deviations are considered random errors. Bias involves the notion of constant error.

Erythema

A severe redness of the skin, as caused by chemical poisoning or sunburn.

Estimate

A numerical value calculated from data. The average is a numerical value of the quantity under measurement. Other parameters, such as the standard deviation, are often estimated from the data.

Etiologic Agent

A viable microorganism or its toxin that causes, or may cause, human disease.

Evaporation

The change of a liquid into a gas at any temperature below its boiling point.

Exposure

The amount of chemical that enters the body by some route for a specified frequency and duration.

Exposure Assessment

A process that takes into account the chemical and physical properties of the substance, the effect the substance produces, the exposure frequency and duration, and the affected subject.

Exposure Routes

The major routes of exposure include ingestion, inhalation, and absorption through the skin.

Extrapolation

An estimate of response or quantity at a point outside the range of the experimental data. Also refers to the estimation of a measured response in a different species or by a different route than that used in the experimental study of interest (i.e., species to species, route to route, acute to chronic, high to low).

Filter, High-Efficiency Particulate Air (HEPA)

A HEPA filter that is at least 99.97 percent efficient in removing particles with a diameter of 0.3 microns.

First Article Test (FAT)

Production testing that is planned, conducted, and monitored by the MATDEV including preproduction and initial production testing conducted to ensure that the contractor can furnish a product that meets the established technical criteria.

First Unit Equipped (FUE)

The first troop unit to be equipped with the first production items/systems.

First Unit Equipped (FUE) Date

The scheduled date a system or end item and its support elements are issued to the designated initial operational capability unit, and specified training in the new-equipment training plan has been accomplished.

Follow-On Evaluation

The testing conducted subsequent to the full production decision to provide data to answer operational issues that were not resolved by earlier operational testing (OT).

Follow-On Operational Test and Evaluation (FOT&E)

A Milestone III production decision to obtain information lacking from earlier initial operational test and evaluation (OT&E).

Normally, FOT&E is conducted subsequent to deciding whether to proceed beyond low-rate initial production.

Functional Proponent (FP)

The representative of the Army Staff Agency responsible for the subject area in which information mission area (IMA) resources are used or are to be used for Major Automated Information Systems Review Council (MAISRC) level systems.

Fungus

A general term used to denote a group of eukaryotic protist, including mushrooms, yeasts, rusts, molds, smuts, etc., which are characterized by the absence of a rigid cell wall composed of chitin, mannans, and sometimes cellulose.

Gas

A state of matter in which the material is compressible and has a low density and viscosity.

Hazard Identification

The process of determining whether exposure to an agent can cause an increase in the incidence of a particular adverse health effect (e.g., cancer, birth defect) and whether the adverse health effect is likely to occur in humans.

Hazard Minimization

The minimization of the amount of waste generated by a product or process.

Hazard Probability

The likelihood that an accident will occur. It is based on an assessment of such factors as location, exposure frequency and duration, and affected population.

Hazard Probability Categories

a. *Frequent*--Likely to occur habitually for a specific individual item; will occur continuously for a fleet or inventory.

b. *Probable*--Will occur several times in the life of a specific individual item; will occur frequently for a fleet or inventory.

c. *Occasional*--Likely to occur sometime in the life of a specific individual item; will occur several times for a fleet or inventory.

d. *Remote*--Unlikely but possible to occur in the life of a specific individual item; unlikely but can reasonably be expected to occur for a fleet or inventory.

e. *Improbable*--So unlikely it can be assumed an occurrence may not be experienced in the life of a specific individual item; unlikely to occur but possible for a fleet or inventory.

Hazard Severity

An assessment of the worst potential consequence (i.e., degree of bodily injury, occupational illness, health-related performance degradation, or bodily system damage which could occur) prior to implementing recommendations to eliminate or minimize the hazard.

Hazard Severity Categories

a. *Category I, Catastrophic*--Hazard may cause death or total loss of a bodily system.

b. *Category II, Critical*--Hazard may cause severe bodily injury, severe occupational illness, or major damage to a bodily system.

c. *Category III, Marginal*--Hazard may cause minor bodily injury, minor occupational illness, or minor damage to a bodily system.

d. *Category IV, Negligible*--Hazard would cause less than minor bodily injury, minor occupational illness, or minor bodily system damage.

Hazardous Material

Any substance that has been determined by the Occupational Safety and Health Administration (OSHA) as having the potential to cause a physical or health hazard. This is based on its potential for burning, exploding, or otherwise causing an injury to workers or the likelihood that exposure will result in acute or chronic health effects among employees.

Hazardous Waste

Any solid waste that is either included on USEPA's list of hazardous wastes or exhibits any of the following characteristics: ignitability, corrosivity, reactivity, or toxicity.

Health Hazard

An existing or likely condition, inherent to the operation or use of materiel, that can cause death, injury, acute or chronic illness, disability, or reduced job performance of personnel by exposure to acoustical energy, biological substances, chemical substances, oxygen deficiency, radiation energy, shock, temperature extremes, trauma, and vibration.

Health Hazard Assessment

The application of biomedical knowledge and principles to document and quantitatively determine the health hazards of systems. This assessment identifies, evaluates, and recommends solutions to control the risks to the health and effectiveness of personnel who test, use, or service Army systems. This assessment includes the evaluation of hazard severity, hazard probability, risk assessment, and operational constraints; the identification of required precautions and protective devices; and the training requirements.

Health Hazard Assessment Report (HHAR)

The formal report documentation for a given system, the assessment of health hazard issues and risks, the recommendation of preventive or control actions, and the recommendation of training requirements.

Health Hazard Domain Report (HHDR)

This report is one of the seven domain reports made under the Manpower and Personnel Integration (MANPRINT) Program. It identifies potential health hazards that may be associated with the development, acquisition, operation, and maintenance of Army systems. This identification will be done early in the system's life cycle to preserve and protect the humans who will:

-
- a. Operate, maintain, and support the equipment.
 - b. Enhance total system effectiveness.
 - c. Reduce system retrofit needed to eliminate health hazards.
 - d. Reduce personnel compensation.

Data from this report are entered into the MANPRINT Report and the System MANPRINT Management Plan (SMMP).

Health Standards

Published documents specifying conditions of acceptable risk for individual health hazards. These can include medical exposure limits, health conservation criteria, and materiel design standards.

Heat Cramps

An illness due, in part, to excessive loss of salt during sweating resulting in painful muscle spasms in the extremities, back and abdomen.

Heat Exhaustion

An illness due to circulatory failure in which venous blood returned to the heart is significantly reduced; fainting may result. This failure is caused because the individual's blood supply is not adequate to serve both heat regulation and other bodily needs.

Heat Strain

The natural, physiological response reaction of the body to the application of heat stress.

Heat Stress

The relative amount of thermal strain from the environment.

Heat Stroke

An illness due to the body temperature reaching a level where sweating stops. The body temperature can then rise to critical levels causing tissue damage and death.

Human Systems Integration (HSI)

See System MANPRINT Management Plan.

Human Systems Integration Plan (HSIP)

See System MANPRINT Management Plan.

Hydrolyzed

Refers to a compound which has undergone chemical reaction with water; hydrolysis is the reaction of a particular compound (such as a chemical warfare agent) with water to form new chemical compounds ("reaction products").

ICT₅₀

Inhalation dose of a chemical agent (vapor or aerosol) that produces a given, defined level of "incapacitation" in 50 percent of the exposed subjects (see ED₅₀, and consider "incapacitation" as the effect). NOTE: There is no general consensus on a military definition of incapacitation. It can refer to behavioral manifestations, physiologic endpoints, or individual combat effectiveness, all of which may vary depending upon the task the individual soldier is expected to accomplish.

ID₅₀

Dose of a liquid chemical agent needed to produce "incapacitation" in 50 percent of the exposed subjects (see note under ICT₅₀).

Idiosyncratic Reaction

A genetically determined abnormal reactivity to a chemical.

Igloo

A reinforced concrete, earth-covered shelter used for storing explosives and munitions.

Immediate Versus Delayed Toxicity

The immediate effects that occur or develop rapidly after a single administration of a substance; delayed effects are those that occur after the lapse of some time. These effects have also been referred to as acute and chronic, respectively.

Immediately Dangerous to Life or Health (IDLH)

The maximum concentration from which, in the event of respiratory failure, one could escape within 30 minutes without a respirator and without experiencing any escape-impairing (for example, severe eye irritation) or irreversible health effects

[(Department of Health and Human Services, National Institute for Occupational Safety and Health (DHHS NIOSH) Publication No. 90-117]. [Respiratory protection and sufficient oxygen to support life (at least 16 percent by volume) are addressed in 29 CFR 1910.134 e(3) and g(5).]

Impervious

Providing protection by precluding penetration of a substance [as demonstrated by methods in Military Standard (MIL-STD) 282] for the useful life of the item concerned.

Incapacitate

Unable to perform normal activities or tasks.

Incapacitating Agent

A chemical agent that produces a temporary, disabling condition that persists for hours to days after exposure has ceased.

Incapacitating Dose

The concentration/dose that renders an individual unable to perform normal activities or tasks.

Incapacitation

Considered to be "moderate-to-severe"--unless otherwise specified. It may include prostration and convulsions.

Incidence

The number of new cases of a disease within a specified period of time or dose.

Incidence Rate

The rate new cases of a disease or condition develop within a specified period of time or dose.

Independent Medical Assessor (IMA)

Personnel, independent of MATDEVs and COMDEVs, who provide health hazard assessment support of Army materiel systems.

Individual Risk

The probability that an individual person will experience an adverse effect. This is identical to population risk unless specific population subgroups can be identified that have different (higher or lower) risks.

Injury

A specific impairment of body structure or function caused by an outside agent or force, which may be physical or chemical.

Initial Response Force

The installation commander and staff who, during the initial period of the emergency, will take emergency response actions necessary to maintain command and control on-site pending arrival of the service response force.

In-Process Review (IPR)

The review of Army acquisition programs other than Department of Defense (DOD) major or Army-designated acquisition programs.

Interspecies Dose Conversion

The process of estimating equivalent doses between species (e.g., frequently a known animal dose is converted to estimate an equivalent human dose). The USEPA's cancer risk assessment guidelines generally recommend using the surface area approach unless there is evidence to the contrary. The dose as milligram/kilogram (mg/kg) of body weight/day divided by a 10-fold uncertainty factor (UF) is generally used to convert between species for noncancer effects of chemicals.

Irritant

A substance that produces an irritating effect when it contacts skin, eyes, nose, or respiratory system.

Joint Table of Allowances (JTA)

A requirements/authorization document of equipment for units operated jointly by two or more military services, such as Mission Area Analysis Group (MAAG) and missions.

LCt₅₀ (Median Lethal Concentration)

A dosage of a substance by inhalation that results in death in 50 percent of the exposed population.

LD₅₀ (Median Lethal Dose)

A dose of a substance that produces death in 50 percent of the exposed population usually as a single dose, with the route of exposure specified.

Life-Cycle System Management Model (LCSMM)

An integrated model of phases, activities, documentation, and decision points guiding the acquisition of Army materiel.

Life-Cycle System Management Model Phases

a. **Phase 0--Concept Exploration and Definition.** This phase conducts competitive, parallel, short-term studies in order to define and evaluate the feasibility of alternative concepts. It also provides supporting analyses and information necessary to assess the relative merits of the concepts at the Milestone 1, Concept Demonstration Approval, decision point. Alternative system design and support concepts are explored within the context of the mission need and program objectives. Emphasis is on generating innovative and conceptual competition from industry research and development (R&D); foreign research, depots, arsenals, and government research; and development and engineering centers and laboratories.

b. **Phase 1--Demonstration and Validation.** During this phase, program risk is identified and reduced as much as possible before selecting a proposed system concept that best meets program objectives and before deciding whether to enter engineering and development with the intent eventually to deploy. This phase focuses on defining critical design characteristics (to include manpower, personnel, and training constraints); addressing manufacturing technological deficiencies; and

assessing production feasibility. Analysis, simulation models, or prototypes are used to optimize design and resolve problems.

c. *Phase 2--Engineering and Manufacturing Development.* This phase designs, fabricates, tests, and evaluates a complete system. This includes the principal items necessary for its production, operation, and support. Reliability, availability and maintainability (RAM) design, testing, and evaluation of components should be integrated into the earliest part of this phase. When making design trade-offs, it is not standard practice to design either to the performance floor or to the cost ceiling. Trade-offs are done in a manner to give optimal, overall system-cost effectiveness. Simplicity is emphasized as opposed to sophistication. High priority is placed on ensuring adequate quantities of equipment can be afforded.

d. *Phase 3--Production and Deployment.* This phase involves the successful completion of technical testing (TT), OT, and Milestone 3 approval permit production at rates based on manufacturing efficiency, operational demand, and resource availability. Initial production items are used for production test and follow-on evaluation as necessary. Production will not, however, be suppressed to await completion of follow-on OT&E. A validated technical data package (TDP) is essential for use in competitive procurement. Therefore, initial production normally will be conducted by the MATDEV. Production rights ordinarily are obtained by the Government. Where economies can be achieved, second production sources will be established at the earliest possible date after a proven TDP is available.

e. *Phase 4--Operation and Support.* During this phase, the materiel system is operated, supported, and maintained according to its intended operational concept. An analysis of the system is conducted to ensure it meets the original requirements and to identify areas for continued improvement in cost, performance reliability, and capability of the system. The system is sustained in the active inventory until a decision is made for upgrade, replacement, or disposal.

Local Versus Systemic Toxicity

Local effects refer to those that occur at the site of entry (e.g., lungs, stomach) of a toxicant into the body; systemic effects are those that are elicited after absorption and distribution of the toxicant from its entry point to a distant site.

Long-Range Research, Development, and Acquisition Plan (LRRDAP)

Two basic plans make up the overall Army Long-Range Plan--the LRRDAP and the Army Materiel Command (AMC) LRRDAP:

a. The LRRDAP:

(1) Displays R&D programs supporting requirements identified by the mission area analysis (MAA, currently obsolete term) and summarized in the Battlefield Development Plan.

(2) Portrays programs over a 15-year period.

(3) Displays research, development, test and evaluation (RDT&E) programs that support procurement.

(4) Is fully compatible with the Planning, Programming, Budgeting and Execution System (PPBES).

(5) Reflects a by-year prioritization.

(6) Is the starting point for research, development, and acquisition (RDA) program building.

b. The AMC LRRDAP consists of two parts: the AMC Long-Range Science and Technology Plan and the AMC Long-Range Development and Acquisition Plan.

(1) The AMC Long-Range Science and Technology Plan:

(a) Defines technology in terms of deliverables to solve system deficiencies identified by MAA (currently obsolete term).

(b) Provides a document that identifies technology-base efforts (6.1, 6.2, and 6.3A) conducted by major subordinate commands and laboratories.

(c) Provides management a baseline for decisions affecting technology-base efforts.

(d) Serves as a means of communicating to the user those technologies that will improve mission performance in the 10- to 20-year future.

(2) The AMC Long-Range Development and Acquisition Plan: specifies system development time lines and the relationship

between the technical base and planned developments and acquisitions.

Lowest-Effect Level (LEL)

The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of effects between the exposed population and its appropriate control group.

Lowest-Observed Adverse Effect Level (LOAEL)

The lowest exposure level at which there are statistically or biologically significant increases in frequency or severity of adverse effects between the exposed population and its appropriate control group.

M13 Portable Decontaminating Apparatus

The M13 is about the size of a 5-gallon gasoline can and is used to decontaminate vehicles and crew-served weapons larger than a .50-caliber piece.

M17 Lightweight Decontamination System (LDS)

The M17 is a portable pump and water heating unit for producing hot water and steam. The system incorporates a 1,580-gallon collapsible water tank, two wand assemblies, connecting hoses, and a shower rail. It is issued to Army battalion-size units and to chemical decontamination companies and battalions.

M18A2 Kit

A kit used by technical escort teams and used in depots. It consists of portable tests capable of detecting selected choking and blood agents as well as nerve agents and blister (mustards, arsenicals, urticants) agents.

M256-Series Chemical Agent Detector Kit

This kit is used at squad, crew or section level to detect and identify field concentrations of nerve, blister or blood agent vapors. The kit consists of 12 individually packaged samplers/detectors and a packet of M8 detector paper.

M258A1 Skin Decontamination Kit

A kit issued to each soldier containing wipes with solutions that will neutralize most nerve and blister agents.

M272 Water Testing Kit

A lightweight kit used to detect and identify dangerous levels of common chemical warfare agents in water sources.

M291 Skin Decontamination Kit

A kit which replaces the M258A1 Skin Decontamination Kit. Packets in the kit consist of a foil-laminated fiber material containing a reactive resin. The kit is used to decontaminate the soldier's hands, face, ears, and neck.

M34 Soil Sampling Kit

The kit is used to sample soil, surface matter, and water.

M8A1 Automatic Chemical Agent Alarm (ACAA) System

The only remote continuous air-sampling alarm in the U.S. Army at present. This alarm will sample the air for the presence of NERVE agent vapors (GA, GB, GD, or VX) only. It is capable of detecting nerve agent levels in 2 minutes or less. The system consists of the M43A1 detector, as many as 5 M42 alarm units, and various power supplies. The detector cell and alarm units are most commonly found in a fixed-site configuration.

M9 Chemical Agent Detector Paper

The M9 self-adhesive paper attaches to most surfaces. The paper indicates the presence of a nerve agent (G or V) or a blister agent (H or L) by turning a red or reddish color.

"Man"

An individual assumed to be a healthy, 18-35 year old, 70 kilogram (kg) adult male.

Manpower and Personnel Integration (MANPRINT)

The process of integrating the full range of manpower, personnel, training, human engineering, health hazard, system safety, and

soldier survivability to improve individual performance and total system performance throughout the entire system development and acquisition process.

MANPRINT Assessment

An assessment conducted prior to each milestone-decision review for all materiel acquisitions, including materiel change and nondevelopmental item (NDI). This assessment determines the status and adequacy of the MANPRINT effort in a materiel acquisition program. The assessment also provides a forum for presenting unresolved MANPRINT issues and concerns to decision makers. The Office of the Deputy Chief of Staff for Personnel (ODCSPER) is responsible for this assessment of acquisition category (ACAT) I and II systems. The AMC U.S. Army Training and Doctrine Command (TRADOC), and the applicable major Army Command (MACOM) are responsible for assessments of ACAT III and IV systems.

MANPRINT Critical Issue

A critical issue may be either a *system characteristic* (e.g., "weight less than 35 pounds when rigged for carry") or a *detailed performance requirement* (e.g., "process at least 30 standard message blocks per hour without error").

MANPRINT Exit Criteria

Specific minimum requirements capable of empirical, objective measurement that must be demonstrated before a system or program may transition to the next phase of its acquisition process. These criteria typically link soldier performance and its principal antecedents (personnel aptitudes, training, and soldier survivability) to total system performance becoming, for a particular acquisition phase, a priority subset of total system requirements. However, said criteria could also be written to require demonstration of a particular outcome (e.g., a performance-based demonstration of the feasibility of a particular training concept). MANPRINT exit criteria are normally written by the MANPRINT Joint Working Group (MJWG) [often in coordination with the Test and Integration Working Group (TIWG)] and are approved by the approval authority for the SMMP.

MANPRINT Integration Report

This system report integrates the results of all seven domain assessments into a single document for input to the decision-review process. It will be prepared prior to milestone decision reviews on all acquisition programs, including materiel change and nondevelopmental items. Personnel Command (PERSCOM) Deputy Chief of Staff for Plan, Force Integration and Analysis (DCSPLANS) will prepare these integration reports for major automated information systems (MAIS) and U.S. Army Research Laboratory--Human Research and Engineering Directorate (ARL-HRED) materiel systems.

MANPRINT Joint Working Group (MJWG)

A multiagency group appointed to manage and integrate MANPRINT activities for a given materiel system.

MANPRINT Review

A review conducted in conjunction with scheduled integrated logistics support management team (ILSMT) reviews. The MANPRINT review determines the adequacy and status of the MANPRINT efforts associated with each acquisition program. Responsibility for conducting these reviews rests with the applicable program sponsor (i.e., the program manager for ACAT I and II systems; project officer or equivalent for ACAT III and IV systems). Results are documented in the appropriate decision documents.

Man-System Integration

The technical process of integrating the human operator with a materiel system to ensure safe, effective operability and supportability.

Manufacturer's MANPRINT Management Plan (MMMP)

The single document used to record a contractor's technical management of a MANPRINT program. The plan may stand alone or may be part of another document or data item.

Market Investigation

The process of gathering information before making acquisition decisions. It is conducted initially during the requirements/technology-base-activities phase, and in greater depth during the proof-of-principle phase.

Materiel Acquisition

The process of acquiring supplies and equipment, facilities, and services, including life-cycle systems management of hardware and software, formulation of requirements, research, development, testing, procurement, production, fielding, operation, support, and disposal.

Material Acquisition Decision Process (MADP)

The formal process for reviewing a program or project at critical points (Milestone Decision Reviews/In-Process Reviews) to evaluate status and make recommendations to the decision authority.

Materiel Developer (MATDEV)

The command or organization responsible for developing or modifying materiel.

Medical Contaminant Criteria

The varying amounts of air contaminants and durations of exposure causing specific adverse effects to health.

Medical Contaminant Standards

The prescribed level of a contaminant that cannot be exceeded.

Metabolic Products

The breakdown products of the chemical processes in living organisms that convert food into new tissues and energy; they are also products or reactions which tend to detoxify nonfood chemicals.

mg-min/m³

Milligram-minutes per cubic meter. It is a product of the concentration of a substance in milligrams per cubic meter times the exposure time in minutes.

Micron

A unit of measurement equal to one-millionth (10^{-6}) of a meter.

Mild Effects

Mild effects for the nerve agents are defined as miosis and/or rhinorrhea. For HD, mild effects are defined as slight ocular (OC) irritation.

Milestones

Decision reviews held to determine whether a program moves forward to the next phase of the LCSMM. The decision reviews may be either ASARC, Defense Acquisition Board (DAB), or IPR forums depending on the acquisition category assigned to the system. The milestones are:

a. **Milestone 0--Concept Studies Approval.** This milestone determines whether a program advances to Phase 0, Concept Exploration and Definition.

b. **Milestone 1--Concept Demonstration Approval.** This milestone determines whether a program advances to Phase 1, Demonstration and Validation.

c. **Milestone 2--Development Approval.** This milestone determines whether a program advances to Phase 2, Engineering and Manufacturing Development.

d. **Milestone 3--Production Approval.** This milestone determines whether a program advances to Phase 3, Production and Deployment.

e. **Milestone 4--Major Modification Approval.** This milestone determines whether a program may need modifications once it has been produced and deployed.

Military Occupational Specialty (MOS)

A term used to identify a grouping of duty positions possessing such a close occupational or functional relationship that an optimal degree of interchangeability among persons so classified exists at any given skill level.

Mini-Cam

Miniature chemical agent monitor.

Minute Volume (MV)

The volume of air expelled from the lungs in a minute which is assumed to be 15 liters--unless otherwise stated. This MV represents mild activity [National Academy of Sciences (1958), Patty (1963), Craig, et al. (1964)].

Miosis

Excessive smallness or contraction of the pupil of the eye.

Mission Area Analysis (MAA)

Currently an obsolete term. An assessment of the capability of a force to perform within a particular battlefield or functional area. The analysis is designed to discover deficiencies in doctrine, training, organizations, and materiel, and to identify means of correcting these deficiencies. It also provides a basis for applying advanced technology to future Army operations.

Mission Area Development Plan (MADP)

Currently an obsolete term. This plan transitions the MAA (currently obsolete term) corrective actions to specific projects with milestone schedules so that resources can be applied to the elimination of the MAA deficiency. Each mission area proponent (TRADOC school) publishes an MADP annually. It contains sections on materiel, doctrinal, organizational, and training corrective actions.

Mission Need Statement (MNS)

A broad statement of mission need, expressed in terms of an operational capability, not a system-specific solution. It identifies and describes the mission need or deficiency in terms of mission, objectives and general capabilities.

Mission-Oriented Protection Posture (MOPP)

Typically used to refer to chemical response personnel's personal protective equipment (PPE).

Mist

The liquid particles up to 100 microns in diameter.

Mustard

The chemical Bis(2-chloroethyl) sulfide, CAS registry number 505-60-2, in pure form and in the various impure forms that may be found in munitions as well as field, industrial, or laboratory operations. These include Levinstein mustard (H), distilled mustard (HD), and closely related preparations. This standard is not meant to be applied to nitrogen mustards.

Mutagen

Anything that can cause a change (mutation) in the genetic material of a living cell.

Mutagenicity

Refers to the cause of changes in cellular genetic material which may be passed on to subsequent generations of cells. When these changes occur in germ cells (i.e., sperm or ova), the mutations may be passed on to subsequent generations.

Mycotoxin

A fungal toxin.

National Contingency Plan (NCP)

The set of regulations that implement comprehensive environmental response, compensation and liability (CERCLA) and direct responsibility and procedures for cleanup of hazardous material spills. The regulations are codified at 40 CFR 300, et seq.

Nerve Agent

Organic esters of phosphoric acid used as a chemical warfare agent because of their extreme toxicity (Tabun-GA, Sarin-GB, Soman-GD, GF, and VX). All are potent inhibitors of the enzyme, acetylcholinesterase, which is responsible for the degradation of the neurotransmitter, acetylcholine. Symptoms result from excess accumulation of acetylcholine in neuronal synapses or myoneural junctions. Nerve agents are readily absorbed by inhalation and/or through intact skin.

No-Observed Adverse Effects Level (NOAEL)

An exposure level at which there are no statistically or biologically significant increases in the frequency or severity of adverse effects (to tissue, cells, organs, etc.) between the

exposed population and its appropriate control (some effects may be produced at this level, but they are not considered as adverse, nor precursors to specific adverse effects). It is based on the highest exposure without adverse effect.

No-Observed Effects Level (NOEL)

An exposure level at which there are no statistically or biologically significant increases in the frequency or severity of any effect (to tissue, cells, organs, etc.) between the exposed population and its appropriate control.

Nondevelopmental Item (NDI)

Those items determined by materiel acquisition decision process (MADP, currently obsolete term) review [i.e., Defense Systems Acquisition Review Council (DSARC), ASARC, or IPR, as appropriate] to be available for acquisition to satisfy an approved materiel requirement with no expenditure of Army RDT&E funds for development, modification, or improvement. The item may be a commercial product or an item that has been developed and used by another service, country, or Government agency.

Nuclear, Biological, and Chemical (NBC) Contamination

The deposit and/or absorption of residual radioactive material or biological or chemical agents on or by structures, areas, personnel, or objects.

Nuclear, Biological, and Chemical Survivability

The capability of a system (and its crew) to withstand an NBC-contaminated environment and relevant decontamination without losing the ability to accomplish the assigned mission. An NBC-contamination survivable system is hardened against NBC contamination and decontaminants. This system can be decontaminated and is compatible with individual protective equipment.

Occupational Environment Controls

The basic principles for controlling the workplace environment are substitution, isolation, and ventilation.

On-Scene Coordinator

The person designated to direct cleanup efforts under the NCP.

Operational Requirements Document (ORD)

A formatted statement containing performance (operational effectiveness and suitability) and related operational parameters for the proposed concept or system. It establishes objectives and minimum acceptable requirements for those performance capability parameters necessary to characterize the proposed system concept. It is the bridge connecting the MNS to the acquisition program baseline (APB) and the specifications for the concept or system.

Operational Testing (OT)

The testing and evaluating of materiel systems accomplished with typical user operators, crews, or units in as realistic an operational environment as possible to provide data for estimating:

- a. The military utility, operational effectiveness, and operational suitability [including compatibility, interoperability, reliability, availability, maintainability, supportability, operational man(soldier)-machine interface, and training requirements] of new systems.
- b. From the user viewpoint, the system's desirability considering systems already available and the operational benefits and/or burdens associated with the new system.
- c. The need for modification to the system.
- d. The adequacy of doctrine, organization, operating techniques, tactics, and training for employment of the system, and, when appropriate, its performance in a countermeasure environment.

Parameter

The property or quantity that measurements are expected to evaluate.

Parasite

A plant or animal that lives upon or within another living organism at whose expense it obtains some advantage.

Particle Size-Selective-Threshold Limit Values (PSS-TLV®s)

Expressed in three forms:

a. Inhalable Particulate Mass-TLVs (IPM-TLVs)--for those materials that are hazardous when deposited anywhere in the respiratory tract. Particles with aerodynamic diameters up to 100 μm are of interest.

b. Thoracic Particulate Mass-TLVs (TPM-TLVs)--for those materials that are hazardous when deposited anywhere within the lung airways and the gas-exchange regions. Particles with aerodynamic diameters up to 25 μm are of interest.

c. Respirable Particulate Mass-TLVs (RPM-TLVs)--for those materials that are hazardous when deposited in the gas-exchange region. Particles with aerodynamic diameters up to 10 μm are of interest.

Particulate

A particle of solid or liquid matter. Particle aerodynamic diameters of biological interest range up to 100 μm .

Percutaneous Exposure

The absorption of a contaminant through the unbroken skin.

Permissible Exposure Limit (PEL)

Time-weighted average concentrations that must not be exceeded during any 8-hour workshift of a 40-hour workweek.

Persistent Agent

Chemical agents that do not hydrolyze or volatilize readily, such as VX and HD.

TLV® is a registered trademark of the American Conference of Governmental Industrial Hygienists, Cincinnati, Ohio. Use of trademarked name does not imply endorsement by the U.S. Army but is intended only to assist in identification of a specific product.

Personnel

a. Military and civilian persons with the abilities, skill level, and grades required to operate, maintain, and support a system in peacetime and wartime. It refers to the Army's ability to provide qualified people of specific aptitudes, experience, and other human characteristics needed to use, operate, maintain, and support Army systems or items. It requires a detailed assessment of the aptitudes that soldiers must possess in order to complete training and to use, to operate, and/or to maintain the system successfully.

b. Iterative analyses must be accomplished as integral components of the new system-design process, comparing projected quantities of qualified personnel with requirements of the new system, any system(s) being replaced, overall Army needs for similarly qualified people, and priorities established by the DA. As necessary, the system is configured specifically to accommodate the probable capabilities of projected personnel so that the new system is supportable from a personnel standpoint. Analysis of specific system personnel requirements using human factors engineering is necessary for each system-design option considered, using "best available" information early in the acquisition process, and using improved information as the system design becomes more mature.

c. These analyses must consider not only simple availability, but also the capability of the Army personnel management system to provide the needed numbers of properly qualified people at a reasonable cost. Personnel must be included in system life-cycle cost estimates and system-design tradeoffs between machine costs versus personnel costs. Personnel analyses and projections are needed in time to allow orderly recruitment, training, and assignment of personnel with equipment fielding.

Planning, Programming, Budgeting, and Execution System (PPBES)

An integrated system for the establishment, maintenance, and revision of the future years' defense plan (FYDP) and the DOD budget.

Pollution Prevention (P2)

To eliminate or minimize hazardous materials through source reduction using methods such as substitution, process change, etc., so that occupational and environmental health effects from hazardous waste or environmental contamination are controlled.

Population

This refers to a group of items/persons/animals belonging to a well-defined class from which items/persons/animals are taken for measurement.

Potential Exposure

Potentially exposed worker.

Potentially Exposed Worker

An individual who works in an agent-operating area where agent levels:

- a. Exceed the protective capability of the PPE.
- b. Are detectable and there is a breach of PPE or engineering controls.

ppm

Parts per million; the number of parts of a given contaminant in a million parts of air.

Preliminary Hazard Analysis (PHA)

The initial effort in hazard analysis during the system design phase or the programming and requirements development phase for facilities acquisition. It may also be used on an operational system for the initial examination of the state of safety. The purpose of the PHA is not to affect control of all risks but is to fully recognize the hazardous states with all of the accompanying system applications.

Preliminary Hazards List (PHL)

The PHL provides the MATDEV with a list of hazards that may require special safety design emphasis or hazardous areas where in-depth analyses need to be done. The MATDEV may use the results of the PHL to determine the scope of follow-on hazard analyses.

Preplanned Product Improvements (P³I)

Planned future evolutionary improvement of developmental systems for which design considerations are affected during development

to enhance future application of projected technology. It includes improvements planned for ongoing systems that go beyond the current performance envelope to achieve a needed operational capability.

Prevalence

The total number of cases of a disease existing in a population at a certain time in a designated area.

Probit Analysis

Application of the methods of Bliss to determine the slope and various effective dosage levels (e.g., LCT_{50} , LD_{50} , LCT_{16} , LD_{16} , LCT_{84} , LD_{84} , LCT_{05} , LD_{05} , etc.) for quantal dose-response data.

Product Improvement Program/Product Improvement Proposal (PIP)

A program to incorporate a configuration change involving engineering and testing effort on major-end items and depot-repairable components or changes on other than developmental items to increase system/combat effectiveness or extend the useful military life. It is a reconfiguration of an end item of Army or multiservice materiel-type classified standard that is funded, managed, and completed as a single project. The term "PIP" is applied to the project from its start as a proposal through its completion. A PIP is initially constituted in the form of a PIP package, and its status is periodically reported in product improvement information reports (PRIMIR).

Program Objective Memorandum (POM)

A document submitted to the Office of the Secretary of Defense (OSD) by the heads of the DOD components that recommends the total resource requirements within the parameters of the Secretary of Defense fiscal guidance.

Program Office and Independent Life-Cycle Cost Estimate (PO&ILCCE)

These statements are two statutorily required cost estimates that are briefed to the Secretary of Defense Cost Analysis Improvement Group (CAIG) before each milestone beginning with Milestone 1.

Program Sponsor

A generic term for the actual manager of the program at its basic level [i.e., the program manager (PM), MADP, Army Designated

Acquisition Program (ADAP), and level I nonmajor programs and the project officer or equivalent for level II and III nonmajor programs].

Properties

The characteristics by which a substance may be identified. Physical properties describe its state of matter, color, odor, and density; chemical properties describe its behavior in reaction with other materials.

Prostration

A complete physical or mental exhaustion; extreme exhaustion or powerlessness.

Protection Factor

With PPE, it is the ratio of the concentration outside the protective equipment to the concentration inside the protective equipment. Measurement sites are critical for proper determination (e.g., for a protective mask, the measurements inside the mask would be made at a subject's breathing zone, and the measurements outside the mask would be made in a corresponding zone).

Prototype

A model suitable for evaluation of design, performance, and production potential.

Range

The difference between the largest and smallest values in a collection of measurements.

Readiness

Phase of preparations to deal with an accident or incident.

Reconstruction

Rebuilding and replacing destroyed structures and utilities to approximate the predisaster condition.

Recovery Phase

a. The period following the response when immediate threat to human life has passed and general evacuation has ceased. This phase includes:

- (1) Recovery phase decontamination, as necessary.
- (2) Reentry.
- (3) Restoration.

b. Recovery refers to the actions taken to restore an affected area to its preemergency condition. Thus, it refers to the process of reducing exposure rates and concentrations in the environment to acceptable levels for unconditional occupancy or use after the emergency phase of an accident or incident. Recovery differs from reentry in that recovery encompasses the efforts and resources needed to return the affected area to its preaccident condition.

c. Recovery includes both short- and long-term activities. Short-term recovery returns vital systems to minimum operating standards, seeks to restore critical services to the community, and provides for the basic needs of the public. Long-term recovery focuses on restoring the community to its normal, or improved state of affairs and on returning life to normal or improved levels. The recovery period is also an opportune time to institute mitigation measures, particularly those related to the recent emergency.

Reentry

The entry of persons into an affected (i.e., contaminated or potentially contaminated) area following a release. The terms *controlled reentry*, *restricted reentry*, *occupational reentry*, and *emergency reentry* refer to the temporary, short-term readmission of persons (primarily emergency workers) into a restricted zone for the purpose of performing specific tasks (such as monitoring teams). The terms *uncontrolled reentry*, *unrestricted reentry*, and *general reentry* are used in the context of uncontrolled, permanent reaccess referring to those provisions leading up to unlimited public access, reoccupation, or use of previously restricted zones after the hazards have been reduced to acceptable levels or have been declared "clean."

Reference Concentration (RfC)

An estimate (with uncertainty spanning perhaps an order of magnitude) of a daily inhalation exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime.

Reference Dose (RfD)

The toxicity value for evaluating noncarcinogenic effects resulting from exposure at Superfund sites. See specific entries for chronic RfD, subchronic RfD, and developmental RfD. The acronym RfD, when used without other modifiers, either refers generically to all types of RfDs or specifically to chronic RfDs; it never refers specifically to subchronic or developmental RfDs.

Relative Risk (sometimes referred to as Risk Ratio)

The ratio of incidence or risk among exposed individuals to incidence or risk among nonexposed individuals.

Release

Controlled or uncontrolled escape of chemical agent(s) into the environment.

Reliability, Availability, and Maintainability (RAM)

Requirements that are imposed on materiel systems to ensure they are operationally ready for use when needed; they will successfully perform assigned functions and can be economically operated and maintained within the scope of logistics concepts and policies. These programs are applicable to materiel systems; test measurement and diagnostic equipment (TMDE); training devices; and facilities developed, produced, maintained, procured, or modified for Army use.

a. Reliability is the duration of probability of failure-free performance under stated conditions.

b. Availability is a measure of the degree to which an item is in an operable and committable state at the start of the mission.

c. Maintainability is the ability of an item to be retained in or restored to specified conditions within a given time when maintenance is performed by personnel having specified skill

levels, using prescribed procedures and resources, at each prescribed level of maintenance and repair.

Relocation

Temporary or permanent removal of a population or community in response to an emergency or disaster. A protective action in which persons are asked to vacate a contaminated area to avoid chronic exposure from deposited contamination. Relocation is distinguished from evacuation in that during an emergency, the potential for a release exists; in contrast, during the relocation phase, there is no passing plume.

Remedial Actions

Actions taken to restore a contaminated site to its precontaminated condition. In contrast to removal actions, these are longer-term actions, including cleanup, treatment, and neutralization of contamination and access control or permanent relocation of residents, if necessary. Remedial actions are coordinated by the remedial project manager. U.S. Department of the Army Pamphlet (DA PAM) 50-6, *Chemical Accident or Incident Response and Assistance (CAIRA) Operations*, treats remedial actions as taking place in a "non-emergency atmosphere," and describes the goal as returning the chemical accident or incident site to "technically achievable and acceptable conditions."

Removal Actions

Immediate, short-term response actions for cleanup and removal of hazardous materials, assessment of the release, and actions to protect the public such as temporary relocation (CERCLA and NCP; 40 CFR 300, et seq). Removal operations are coordinated by the on-scene coordinator.

Reproductive Effect

A toxic effect of a substance that is evident in the second or third generation of exposed grandparents.

Request for Proposal

A request for the manufacturer to submit a proposal supported by cost breakdown. It provides a description of the items to be procured. This proposal may include specifications, quantities, time and place of delivery, method of shipment, packaging and instruction manual requirements, materiel to be furnished, and data requirements, both support and administrative.

Requirements Documents

Documents establishing the need for a materiel acquisition program, how the materiel will be employed, and what the materiel must be capable of doing. The three requirements documents are:

- a. Mission Need Statement (MNS)**--Nonsystem-specific statement of operational capability need. This document can initiate a materiel acquisition program.
- b. Operational Requirements Document (ORD)**--Statement of performance and related operational parameters of a proposed concept or system. It is developed during Phase 0 and defines system capabilities needed to satisfy the MNS. It also includes HSI constraints and environmental conditions that may affect the system.
- c. System Threat Assessment Report (STAR)**--Document prepared for Milestone 1 that documents the services threat assessment at system level. It substantiates ACAT I programs. Similar type documents are prepared for ACAT II, III, and IV programs.

Residual Hazards

Hazards that are not eliminated by design.

Residual Risk

The probability or likelihood of injury resulting from the actual use of a substance in the quantity and manner proposed once all recommendations to eliminate or minimize the hazard have been implemented.

Response Phase

Response activities are immediate actions taken in response to an actual or potential chemical agent release. This phase includes actions taken to eliminate the source of the release, lifesaving measures for affected personnel, safety measures for potentially affected personnel, and initial security measures taken to preclude the exposure of additional personnel.

Restoration

Removal and decontamination of all chemical warfare agents, removal of any rubble, and emergency repair of structures and facilities. These activities will reestablish major utilities and services and will return social and economic activities to

near-normal levels. The terms *recovery* and *restoration* have been used in combination to refer to the entire group of activities undertaken to prepare a previously contaminated and restricted area for unlimited reoccupation and/or use by the public. This will include all efforts and resources needed to return an agent-affected area to a condition safe for public access and use.

Restricted Area or Zone

An area with controlled access from which the population has been evacuated or relocated; any area to which access is controlled for the protection of individuals from exposure to contamination from chemical agents.

Retrofit

The application of measures or controls to correct deficiencies in fielded systems.

Return

Refers to the reoccupation of areas cleared for unrestricted residence or use by previously evacuated populations. It includes what was termed "resettlement" in earlier draft USEPA guidance.

Reversible Versus Irreversible Toxicity

Reversible toxic effects are those that can be repaired, usually by a specific tissue's ability to regenerate or mend itself after chemical exposure, while irreversible toxic effects are those that cannot be repaired.

Rhinitis

The inflammation of the mucous membrane of the nose.

Rickettsia

A microorganism of the genus *Rickettsia*, made up of small rod-shaped coccoids occurring intracytoplasmically or free in the lumen of the gut of lice, fleas, ticks, and mites, by which they are transmitted to man and other animals. They cause diseases such as typhus, scrub typhus, and Rocky Mountain Spotted Fever in humans.

Risk

The probability or likelihood of an adverse effect or event (e.g., injury, disease, or death) resulting from the actual use of a substance in the quantity and manner proposed. It is the *product* of (1) the probability that an adverse effect or event will occur under specific circumstances of exposure and (2) the probability that those specific circumstances of exposure will be realized. In quantitative terms, risk is expressed in values ranging from zero (representing the certainty that harm will not occur) to one (representing the certainty that harm will occur).

Risk Assessment

The scientific process of evaluating the toxic properties of a chemical and the conditions of human exposure to it, in order to both ascertain the likelihood that exposed humans will be adversely affected, and to characterize the nature of the effects they may experience. It may contain some or all of the following four steps:

- a. **Hazard Identification**--The determination of whether a particular chemical is or is not causally linked to particular health effect(s).
- b. **Dose-Response Assessment**--The determination of the relation between the magnitude of exposure and the probability of occurrence of the health effects in question.
- c. **Exposure Assessment**--The determination of the extent of human exposure.
- d. **Risk Characterization**--The description of the nature and often the magnitude of human risk, including attendant uncertainty.

Risk Assessment Code (RAC)

A code used to quantify risk to personnel operating or maintaining the system or conducting an operation. The RACs show the adverse health effect or possible loss of bodily systems described in categories of hazard severity and hazard probability. The RAC is assigned based on the failure to implement the recommendations for eliminating or minimizing the hazard.

Risk Management

A decision-making process that entails consideration of political, social, economic, and engineering information with risk-assessment information to develop, analyze, and compare regulatory options and to select the appropriate regulatory response to a potential health risk.

Safety

The opposite of risk. It is the probability that harm will not occur under specified conditions.

Safety Assessment Report (SAR)

A formal summary of the safety data collected during the design and development of the system. In the SAR, the MATDEV summarizes the hazard potential of the item, provides a risk assessment, and recommends procedures or other corrective actions to reduce these hazards to an acceptable level.

Safety Factor

A term formerly applied to the concept of uncertainty. (See Uncertainty Factor).

Sample Data Collection (SDC)

A method for obtaining information on the performance and maintainability of an item of equipment. Data are obtained directly from observations made in the field. An effort is made to see that the sample from which feedback is obtained represents the total population.

Sarin

Isopropyl methylphosphonofluoridate; it is a nonpersistent organophosphate nerve agent also known as GB. Its chemical formula is $C_4H_{10}FO_2P$.

Senior FEMA Official (SFO)

The official appointed by the director of FEMA, or by the representative of the director of FEMA, to direct the FEMA response in a chemical accident or incident. As the lead FEMA official, the SFO will coordinate the Federal agency off-site response activities and participate in the presentation of the

Federal protective action recommendations to the State governor or the State governor's representative.

Service Response Force Commander (SRFC)

A general officer of the Army with chemical background who has been dispatched by Headquarters, AMC, to the scene of a chemical accident or incident. Upon arrival, the SRFC assumes responsibility for all operations at the accident scene and commands all emergency forces.

Severe Effects

Effects for the nerve agents include systemic effects such as vomiting, involuntary urination and/or defecation, tremors, collapse, or convulsions. Note that dosages producing these effects may not be significantly different from dosages producing lethality. For HD severe, nonlethal effects consist of skin burns--severe redness (erythema) and blistering (vesication).

Severity

The degree to which an effect changes and impairs the functional capacity of an organ system.

Shock

The delivery of a mechanical impulse or impact to an individual transmitted from the acceleration or deceleration of a medium with which an individual has contact.

Short-Term Exposure

Multiple or continuous exposures occurring over a week or so.

Short-Term Public Emergency Guidance Level (SPEGL)

A suitable concentration of a substance in air (as a gas, vapor, or aerosol) for unpredicted, single, short-term, emergency exposure of the general public.

Simulant

A chemical that appears and acts like an agent.

Slope

The probit or Bliss slope of the graph of the probit of the response vs. the log of the dose.

Slope Factor

A plausible, upper-bound estimate of the probability of a response-per-unit intake of a chemical over a lifetime. The slope factor is used to estimate an upper-bound probability of an individual developing cancer as a result of a lifetime of exposure to a particular level of a potential carcinogen.

Smoke

Solid or liquid particles 0.3 to 0.5 micron in diameter.

Soldier

This term refers to human beings, military and/or civilians.

Soldier-Machine Interface

Consideration through system and analysis and psychophysiology of equipment design and operational concepts to ensure they are compatible with the capabilities and limitations of operators and maintenance personnel. It is also referred to as soldier-materiel interaction and man-machine interface.

Soldier Survivability

That characteristic of soldiers that enables them to withstand (or avoid) adverse military action (both friend and foe) or the effects of natural phenomena that would result in the loss of capability to continue effective performance of the prescribed mission. System design considerations are a combination of, but not limited to, those system characteristics that:

- a. Reduce fratricide.
- b. Reduce detectability of the soldier.
- c. Prevent attack on the soldier, if detected.
- d. Prevent bodily damage, if attacked.

e. Minimize medical injury, if wounded.

f. Reduce physical and mental fatigue.

Soldier Survivability Domain Report (SSDR)

A report prepared to reflect the system's effects regarding antifratricide and soldier survivability. Data from this report are entered into the MANPRINT Integration Report.

Soman

The chemical Pinacolyl methyl phosphonofluoridate, methyl-1, 2, 2-trimethylpropyl ester. It is a nerve agent known as GD; its chemical formula is $(CH_3)_3CCH(CH_3)OPF(O)CH_3$.

Source Selection Evaluation (SSE)/Source Selection Process

The process wherein the requirements, facts, recommendations, and government policy, relevant to an award decision in a competitive procurement of a system/project, are examined and the decision is made.

Special Study Group (SSG)

A group composed of representatives of the Headquarters Department of the Army (HQDA), the COMDEV, the operational tester, the MATDEV, the logistician, the trainer, and the PM designee that convenes during the requirements/technology base activity phase to conduct analysis. The SSG ensures inclusion of all alternatives within an analysis, monitors experimentation, or undertakes other tasks that may require concentration of special expertise for a short duration. This group is normally chaired by a COMDEV representative. A MATDEV representative on the SSG develops the acquisition strategy.

Special Task Force (STF)

A group that is normally composed of the chartered task force director and representatives of the user, the MATDEV, the trainer, the COMDEV, the HQDA, the operational tester, and the PM designee. This task force conducts an in-depth investigation of the need for the system described in the requirements documents and of any necessary alternative system designs. It monitors experimentation and arrives at a recommended approach to provide the system described in an approved ORD.

Standard Air

The air at 70 degrees Fahrenheit (70°F), 29.92 inches Hg, weighing 0.075 pounds per cubic foot.

Staphylococcus Enterotoxin Type B (SEB)

A rapid acting toxin that causes vomiting, diarrhea, and painful cramps.

State Coordinating Officer

An official designated by the governor of the affected state to work with the senior FEMA official and service response officer in coordinating among federal, state, local, and private agencies.

Subchronic Exposure

Multiple or continuous exposures occurring usually over two weeks to seven years.

Subchronic Reference Dose (RfD_s)

An estimate (with uncertainty spanning perhaps an order of magnitude or greater) of a daily exposure level for the human population (including sensitive subpopulations) that is likely to be without an appreciable risk or deleterious effects during a portion of a lifetime (as a Superfund program guideline, 2 weeks to 7 years).

Sulfur Mustard

A blister agent also known as H (or HD) for distilled mustard. Bis(2-chloroethyl) sulfide. The chemical formula is C₄H₈Cl₂S.

Super Tropical Bleach (STB)

A mixture of calcium oxide and bleaching powder used as a decontaminating agent.

Supportability

That characteristic of materiel indicative of its ability to be sustained at a required readiness level when supported according to specified concepts and procedures.

Survivability

The capability of a system to avoid or withstand man-made hostile environments without suffering an abortive impairment of its ability to accomplish its designated mission.

Symptom

Information related by an individual about himself/herself that may indicate illness or injury. Signs or observations are made about an individual or an animal that may indicate illness or injury.

System

A composite, at any level of complexity, of personnel, procedures, materials, tools, equipment, facilities, and software. The elements of this composite entity are used together in the intended operational or support environment to perform a given task or to achieve a specific production, support, or mission requirement.

System MANPRINT Management Plan (SMMP)

The Army's HSIP. It is a planning and management tool that outlines and documents the HSI management approach, associated decisions and planning efforts, user concerns, and resolution of HSI (MANPRINT) issues during system development and acquisition process. Identifying and documenting these issues early in the system acquisition process increases the probability of their resolution, thereby enhancing total system performance, affordability, supportability, and conservation of the Army resources.

System Safety Domain Report (SSDR)

One of the seven domain reports prepared under the MANPRINT program. The report assesses the overall safety of the emerging or changing systems, ensures the system safety issues and concerns are identified, and recommends that solutions be integrated into the MANPRINT program. Data from this report are entered into the MANPRINT Integration Report.

System Safety Engineering (SSE)

The application of system safety management and engineering principles throughout a system's life cycle.

System Safety Program Plan

A description of the planned methods used by the contractor to implement the tailored requirements of MIL-STD 882B, including organizational responsibilities, resources, methods of accomplishment, milestones, depth of effort, and integration with other program engineering and management activities and related systems.

Systemic

Spread throughout the body, affecting all body symptoms and organs, not localized in one spot or area.

Systemic Effects

Effects that require absorption and distribution of the toxicant to a site distant from its portal of entry, at which point effects are produced. Most chemicals that produce systemic toxicity do not cause a similar degree of toxicity in all organs, but usually demonstrate major toxicity to one or two organs. These are referred to as target organs of toxicity for that chemical.

Systemic Toxicity

See systemic effects.

T

Bis[2-(2-chloroethylthio)ethyl] ether. The chemical formula is $C_8H_{16}Cl_2OS_2$. T is a sulfur, oxygen and chlorine compound similar in structure to HD. When T is added to HD, the resulting mixture has enhanced physiological and physical effects, making it a more effective chemical warfare agent.

Table of Distribution and Allowances (TDA)

A requirements/authorization document that prescribes the organizational structure, personnel and equipment authorizations, and requirements of a military unit to perform a specific mission for which there is no appropriate Table of Organization and Equipment (TO&E).

Table of Organization and Equipment (TO&E)

A table that prescribes the normal wartime mission, organizational structure, and personnel and equipment requirements for a military unit. It is the basis for an authorization document but is not an authorization document.

Tabun

Ethyl N,N-dimethylphosphoramidocyanidate. This is a non-persistent organophosphate nerve agent also known as GA. Its chemical formula is $C_5H_{11}N_2O_2P$.

Target Audience Description (TAD)

A description which lists the occupational identifier for personnel who are projected to operate, maintain, repair, and support a specific future Army system. Further, for each identifier, the TAD states the quantities needed and provides an information source that will describe the characteristics of the personnel identified. Describing projected system personnel early in the acquisition process increases the Army's flexibility to achieve the best system solution in terms of design, affordability, supportability, and performance.

Target Organ of Toxicity

See systemic effects.

TD₅₀ (Toxic Dose)

The dose of a substance needed to produce a defined toxic effect in 50 percent of the exposed population. It is an infrequently used term, equivalent to ED₅₀ where "toxicity" is the measured "effect."

Technology Base

The Army's science and technology base consisting of basic research, exploratory development, and advanced development.

Temperature Extremes

Environmental conditions that will cause adverse effects on individuals. These conditions may cause heat illness or cold injury.

Teratogen

An agent or substance that may cause physical defects in the developing embryo or fetus when a pregnant female is exposed to that substance.

Test and Evaluation Master Plan (TEMP)

The basic planning document for all life-cycle test and evaluation (T&E) related to a particular acquisition system. This plan documents the overall structure and objectives of the T&E program. It identifies necessary developmental test and evaluation (DT&E) and OT&E activities. It relates test objectives to required system characteristics and critical issues; it integrates objectives, responsibilities, resources, and schedules for all tests and evaluations (T&Es) to be accomplished.

Test and Integration Working Group (TIWG)

A formally chartered organization chaired by the MATDEV and having as a minimum membership representatives (with authority to act for their respective commands/activities) from the COMDEV, the logistician, the operational tester, the MATDEV, and when appropriate, the contractor. The primary purpose of the TIWG is to provide a forum for direct communication to facilitate the integration of test requirements and speed up the TEMP coordination process. The objective of this group is to reduce costs by integrating testing to the maximum extent, eliminating redundant testing, facilitating the coordination of test planning, interchanging test data, and using test resources to achieve cost-effective testing.

Th₅₀ or ThCt₅₀

The vapor dosage producing the defined threshold (low-level) response in 50 percent of the given population. Within the context of this Glossary, the route of exposure can be either inhalation or percutaneous. (Note that percutaneous vapor effects can also include direct vapor effects upon the eyes.)

Threshold

The dose or exposure at which a specified effect begins to be produced.

Threshold Dose

The smallest amount of toxic substance that can produce the first recognizable injuries (e.g., irritation of skin, eyes, or nose; miosis).

Threshold Limit Value (TLV)

A value that refers to airborne concentrations of substances and represents conditions under which it is believed nearly all workers may be repeatedly exposed day after day, without adverse health. A table of these values and accompanying precautions is published annually by the ACGIH.

Threshold Limit Value Categories

a. *Threshold Limit Value-Time-Weighted Average (TLV-TWA).*

The time-weighted average concentration for a normal 8-hour workday and a 40-hour workweek, to which nearly all workers may be repeatedly exposed, day after day, without adverse effect.

b. *Threshold Limit Value-Short-Term Exposure Limit (TLV-STEL).* The concentration to which workers can be exposed continuously for a short period of time without suffering from (1) irritation, (2) chronic or irreversible tissue damage, or (3) narcosis of sufficient degree to increase the likelihood of accidental injury, impair self-rescue, or materially reduce work efficiency, provided that the daily TLV-TWA is not exceeded. It is not a separate independent exposure limit; rather, it supplements the time-weighted average (TWA) limit where there are recognized acute effects from a substance whose toxic effects are primarily of a chronic nature. Exposures up to the STEL should not be longer than 15 minutes and should not occur more than four times per day.

c. *Threshold Limit Value-Ceiling (TLV-C).* The concentration that should not be exceeded during any part of the working exposure.

Time-Weighted Average (TWA) Concentration

The concentration of airborne contaminants that have been weighted for the time duration, usually eight hours. A sufficient number of samples are needed to determine a TWA concentration throughout a complete cycle of operations or through the work shift.

Time-Weighted Average Exposure

An average over a given (working) period of an individual's exposure, as determined by sampling at given times during the period.

Total System

A system is a composite of people, procedures, materials, tools, equipment, and software that provides an operational capability to perform a stated mission (in the case of a weapon system) or a particular function or set of functions [in the case of an Automated Information System (AIS)]. A total system includes:

- a. Manpower-the number of civilian and military personnel required for its operation, maintenance, and support.
- b. Personnel-aptitudes, capabilities, and limitations of the designated operators, maintainers, and support personnel.
- c. Affordable school and unit training necessary to ensure that those personnel can achieve the system performance requirements, and the required support equipment and doctrine.

Total System Performance

This performance is customarily measured in two relatively independent areas: effectiveness (how well it works when it does work) and availability (how often it works). Both areas are heavily dependent upon human performance but usually from different personnel:

- a. Effectiveness is largely influenced by operator behavior (based on aptitudes and training).
- b. Availability is influenced by the behavior (often based on different aptitudes and different training) of maintenance and support personnel. Different measures of performance are used in the T&E of operations and maintenance, and both should be clearly stated in the SMMP.

Toxicity

The capacity of a substance to induce injury. It describes the nature, degree, and extent of undesirable effects.

Toxicity Data

a. **Quantal Data**--Specifies the number of animals affected as a function of dose rate (e.g., mg/kg/day) for a single type of effect. The number of animals with tumors or that die from a chemical exposure are examples. Quantal data are often reported as an incidence (percent response) and, thus, can be used to construct a dose-response curve.

b. **Continuous Data**--Represents the change in some measured value of a biological indicator (e.g., organ weights, tri-glyceride levels in the liver, and serum enzyme measurements) as a function of dose rate. Continuous data can be used to construct a dose-effect curve.

c. **Graded Data**--Specifies the form of severity of adverse effects as a function of dose rate without reference to the number of animals affected or to a continuous measure of one parameter. Graded data often are presented as categories (liver necrosis, lung lesions) or as judgments of severity. Fatty infiltration of the liver, single-cell liver necrosis, and liver necrosis are examples of sequence of severity judgments. Graded data can be used to construct a dose-severity curve.

Toxicity Value

A numerical expression of a substance's dose-response relationship that is used in risk assessments. The most common toxicity values used in Superfund program risk assessments are reference doses (for noncarcinogenic effects) and slope factors (for carcinogenic effects).

Toxicological Effects

a. **Additive**--Situation in which the combined effect of two chemicals is equal to the sum of the effect of each agent given alone (e.g., $2+3=5$).

b. **Synergistic**--Situation in which the combined effect of two chemicals is much greater than the sum of the effect of each agent given alone (e.g., $2+3=20$).

c. **Potentiation**--Situation in which one substance does not have a toxic effect, but when it is added to another chemical, it makes the latter much more toxic (e.g., $0+3=10$).

d. **Antagonism**--Situation in which two chemicals given together interfere with each other's actions or one interferes

with the action of the other chemical (e.g., $4+6=8$, $4+0=1$, $4+4=0$).

Toxic--Poisonous

These effects may range from mild to lethal depending on the dose and resistance of the individual.

Trade-Off Analysis (TOA)

A document prepared by an STF or SSG, or jointly by the COMDEVs and MATDEVs, to determine which technical approach offered in the trade-off determination (TOD) is best.

Trade-Off Determination (TOD)

The document prepared by the MATDEV. It is sent to the COMDEV or to an STF or SSG to convey the feasibility of a potential system. Included are technical risks related to each approach, estimated (RDT&E), and procurement costs and schedules.

Training

a. The instruction necessary and the time required to impart the requisite knowledge, skills, and abilities to qualify Army personnel for use, operation, maintenance, and support of Army systems or items. It involves:

(1) The formulation and selection of engineering design alternatives that are supportable from a training perspective.

(2) The documentation of training strategies.

(3) The timely determination of resource requirements to enable the Army training system to support system fielding.

b. Human factors engineering techniques are used to determine the tasks that must be performed by the system user, the operator, the maintenance and support personnel; the conditions under which they must be performed; and the performance standards which must be met. This training is linked with personnel analyses and actions in that availability of qualified personnel is a direct function of the training process. As a minimum, the following must be considered:

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- (1) Training effort and costs versus system design.
 - (2) Training times.
 - (3) Training program development, considering aptitudes of available personnel.
 - (4) Sustainment training, as distinguished from training associated with initial system fielding.
 - (5) Developmental training, as distinguished from initial entry training.
 - (6) Training device design, development, and use.
 - (7) Training base resourcing manpower and personnel implications.
 - (8) New equipment training (NET).
 - (9) Formal-training-base instruction versus on-the-job-training (OJT) in units.
 - (10) Unit training.
 - (11) Operational testing of the adequacy of training programs and techniques.

Training Device

Any three-dimensional object developed, fabricated, or procured specifically for improving the learning process. These devices may be either system devices or nonsystem devices. System devices are designed for use with one system or item of equipment, including subassemblies and components. Nonsystem devices are designed to support general military training and/or are designed for use with more than one system or item of equipment, including subassemblies and components.

Tumor

A swelling or enlargement due to pathogenic overgrowth of tissue.

Type Classification (TC)

This identifies the life-cycle status of a materiel system by the assignment of a type classification designation after a

production decision by the appropriate authority. It records the status of a materiel system in relation to its overall life history as a guide to procurement, authorization, support, asset, and readiness reporting.

Uncertainty Factor (UF)

One of several, generally 10-fold, factors used in operationally deriving a standard or an RfD from experimental data. UFs are intended to account for:

- a. The variation in sensitivity among the members of the human population.
- b. The uncertainty in extrapolating animal data to the case of humans.
- c. The uncertainty in extrapolating from data obtained in a study involving less-than-lifetime exposure.
- d. The uncertainty in using LOAEL data rather than NOAEL data.
- e. The inability of any single study to address adequately all possible adverse outcomes in man.

Unitary Chemical Munitions

Munitions designed to contain a single-component chemical agent for release on a target.

Vapor

The gaseous form of substances that are normally in the solid or liquid state that can be changed to this state by increasing the pressure or decreasing the temperature. These vapors will diffuse.

Vaporization

Change of a substance from a liquid into a gas.

Ventilation

One of the principal methods to control health hazards; it may be defined as "causing fresh air to circulate to replace foul air simultaneously removed."

Ventilation, Dilution

Airflow designed to dilute contaminants to acceptable levels.

Ventilation, Mechanical

Air movement caused by a fan or other air-moving device.

Ventilation, Natural

Air movement caused by wind, temperature difference, or other nonmechanical factors.

Vesicant

Causing blisters or vesicles.

Vesication

The process of blistering.

Virus

Any of various submicroscopic pathogens consisting essentially of a core of a single nucleic acid surrounded by a protein coat, having the ability to replicate only inside a living cell.

Weight of Evidence Classification

A USEPA classification system for characterizing the extent to which the available data indicate that an agent is a human carcinogen. Recently, USEPA has developed weight-of-evidence classification systems for some other kinds of toxic effects, such as developmental effects.

XM21 Remote Sensing Chemical Agent Alarm (RSCAAL)

A passive infrared device used to detect and identify chemical agent clouds. It can perform reconnaissance and point or area surveillance missions.